Spaceflight Toxicology

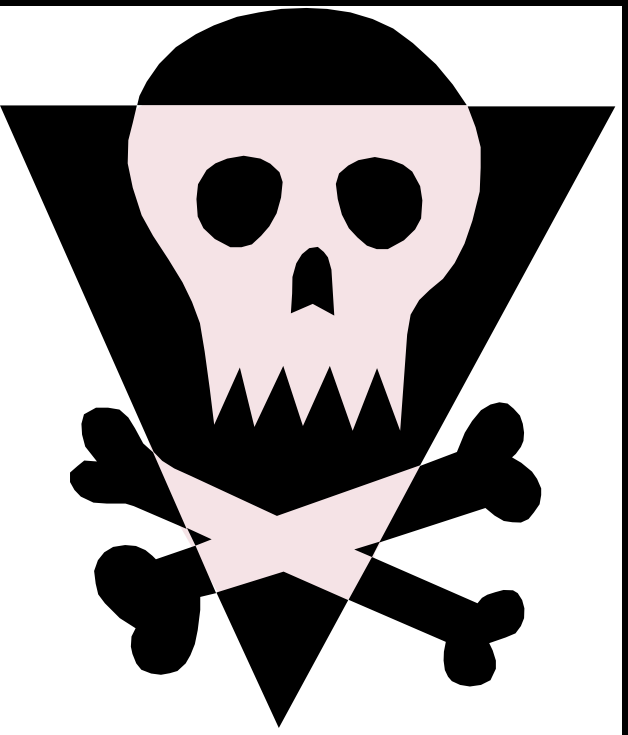
Valerie Meyers, Ph.D.

Mission

- To protect crews from toxic exposures during spaceflight

Assessing Health Hazards

- Payload chemicals
  - Composition
  - Concentration
  - Volume
- Irritancy Potential
  - Eye
  - Respiratory
  - Skin



Toxicological Hazard Levels

Hazard Level	Irritancy	Systemic Effects	Containability
0	Slight-lasts <30 min-no therapy	None	+/-
1	Slight to moderate-lasts >30 min-therapy	Minimal effects-no potential for long-term effects	+/- Surgical masks, gloves, goggles
2	Moderate to severe-possible long-term effects	Minimal effects-no potential for long-term effects	+ Surgical masks, gloves, goggles
3	Moderate to severe-possible long-term effects	Appreciable effects-potential for long-term effects	+ Quick-don masks and gloves
4	Moderate to severe-possible long-term effects	Appreciable effects-potential for long-term effects	- Quick-don masks and ARS or evacuation

Setting Limits

- Spacecraft Maximum Achievable Concentrations (SMACs)
- Spacecraft Water Exposure Guidelines (SWEGs)

Offgas Testing

- "Materials used in habitable areas of spacecraft, including the materials of the spacecraft, stowed equipment, and experiments, must be evaluated for flammability, odor, and offgassing characteristics".

Monitoring

- Real-time
  - CO2
  - Formaldehyde badges
  - compound specific analyzer for combustion products (CSA-CP)
- Post-flight
  - Grab sample containers

Lunar Airborne Dust Toxicity Advisory Group

- Formed in 2005 to address the problem of setting health standards for astronaut exposure to lunar dust
- Animal instillation experiments

http://microgravityuniversity.jsc.nasa.gov/